Soldier Loads in Combat

The Modern Soldier's Combat Load

Helicopter and Dismounted Combat Operations in Iraq and Afghanistan

15 December 2004

Lieutenant Colonel Charles E. Dean
Natick Soldier Center
CALL Helo CAAT Mission Leader

First U.S. load studies in combat since USMC Makin Island Raid Aug 17, 1942.
First known U.S. Army battlefield load studies in history.

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Soldier Loads in Combat

"On the field of battle man is not only a thinking animal, he is a beast of burden. He is given great weights to carry. But unlike the mule, the jeep, or any other carrier, his chief function in war does not begin until the time he delivers that burden to the appointed ground…In fact we have always done better by a mule than by a man. We were careful not to load the mule with more than a third of his weight."

S.L.A. Marshall

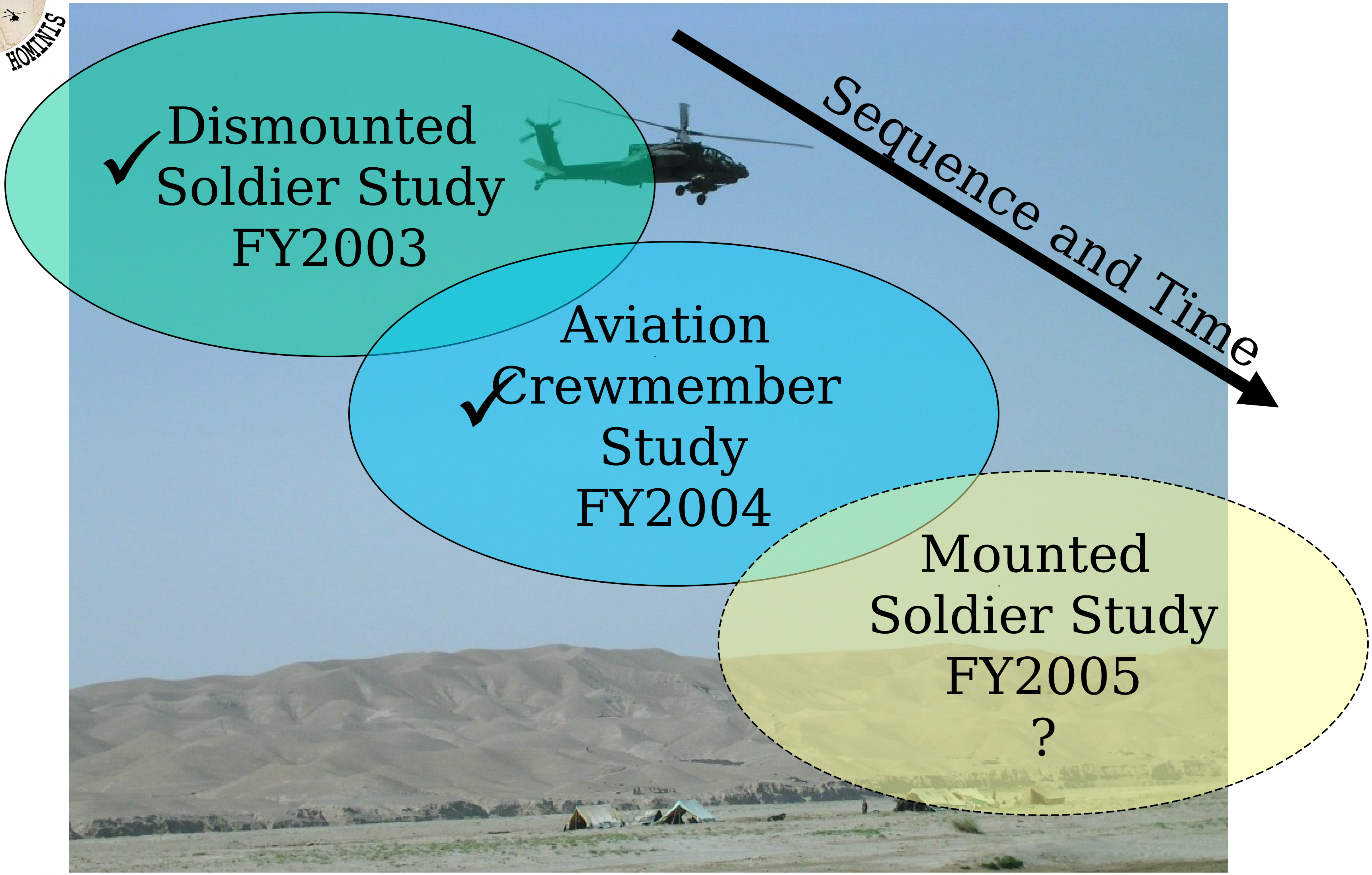
The Soldier's Load and the Mobility of a Nation
1950
Colonel S.L.A. Marshall

Soldier Loads in Combat

Combined Arms Assessment Team (CAAT) CAAT Mission Statement

Conduct battlefield studies of the modern Soldier's Combat Load in order drive Army reductions over this decade to equipment weight and bulk while enhancing Soldier performance capabilities. Directly support development of the Future Force Warrior and Soldier as a System .

Soldier Loads in Combat



✓ Dismounted Soldier Study FY2003

✓ Aviation Crewmember Study FY2004

Mounted Soldier Study FY2005 ?

Sequence and Time

Soldier Loads in Combat

Experienced Volunteers Only

Dismounted Study Volunteers

*Infantrymen

*Airborne and Ranger qualified

*Top physical condition

*Willing to carry equivalent loads as Soldiers and face same dangers

*Willing to collect data in combat

*Willing to fight when required

*Willing to take orders from

all unit leader

isteners and learners

unit approval for

nounted combat

icipation

Helicopter Study Volunteers

*Helicopter Crewmembers

*Rated pilots and Nonrated Crewchiefs

*Willing to collect data in combat

*Willing to fight when required

*Good listeners and learners

*Parent unit approval for aero combat participation

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Dismounted Combat Load Study, Mar-May 2003

Devil CAAT!

GUARD OF HONOR
YOU'RE SAFE HERE
STRIKE HOLD

SFC Mike Dougherty
Training NCO
6th RTB

Mr. Fred DuPont
Team Historian
NSC
With Helo CAAT

CPT Rich Covert
Operations Officer
6th RTB
With 4th ID in Iraq

MSG Kurt Donaldson
A/Team Sergeant
6th RTB

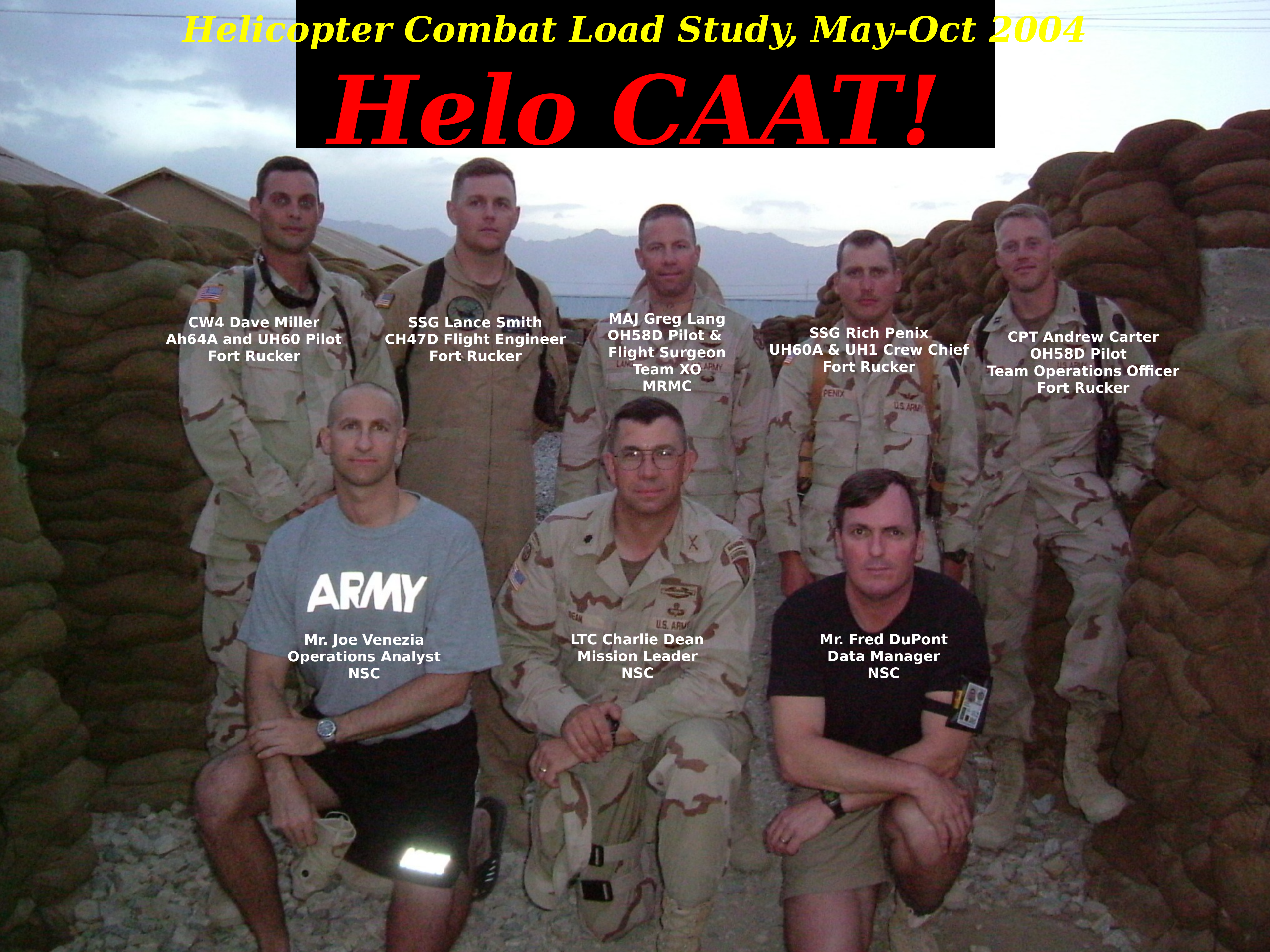
LTC Charlie Dean
Team Leader
NSC
With Helo CAAT

MAJ Eric Glenn
Executive Officer
PEO Soldier

MSG Henry Sanchez
Team Sergeant
11th IN Regt
With 173d Abn in Iraq
And Afghanistan

Helicopter Combat Load Study, May-Oct 2004

Helo CAAT!



CW4 Dave Miller
Ah64A and UH60 Pilot
Fort Rucker

SSG Lance Smith
CH47D Flight Engineer
Fort Rucker

MAJ Greg Lang
OH58D Pilot &
Flight Surgeon
Team XO
MRMC

SSG Rich Penix
UH60A & UH1 Crew Chief
Fort Rucker

CPT Andrew Carter
OH58D Pilot
Team Operations Officer
Fort Rucker

Mr. Joe Venezia
Operations Analyst
NSC

LTC Charlie Dean
Mission Leader
NSC

Mr. Fred DuPont
Data Manager
NSC

Soldier Loads in Combat

Combat Load Definitions

Combat Load: ***The minimum mission-essential equipment, as determined by the commander responsible for carrying out the mission, required for Soldiers to fight and survive immediate combat operations. The combat load is the essential load carried by Soldiers in forward subunits or the load that accompanies Soldiers other than fighting loads.*** **(FM 21-18)**

Fighting Load: The fighting load includes bayonet, weapon, clothing, helmet, and LBE, and a reduced amount of ammunition. Keep under 48 pounds when cross-loading small unit equipment. (FM 21-18)

Approach March Load: The approach march load includes clothing, weapon, basic load of ammunition, LBE, small assault pack, or lightly loaded rucksack or poncho roll. A limit of 72 pounds should be enforced. (FM 21-18)

Emergency Approach March Loads: Circumstances could require Soldiers to carry loads heavier than 72 pounds such as approach marches through terrain impassable to vehicles or where ground/air transportation resources are not available. Therefore, larger rucksacks must be carried. These emergency approach march loads can be carried easily by well-conditioned Soldiers. When the mission demands that Soldiers be employed as porters, loads of up to 120 pounds can be carried for several days over distances of 20 km a day. Although loads of up to 150 pounds are feasible, the Soldier could become fatigued or even injured. If possible, contact with the enemy should be avoided since march speeds will be slow. (FM 21-18)

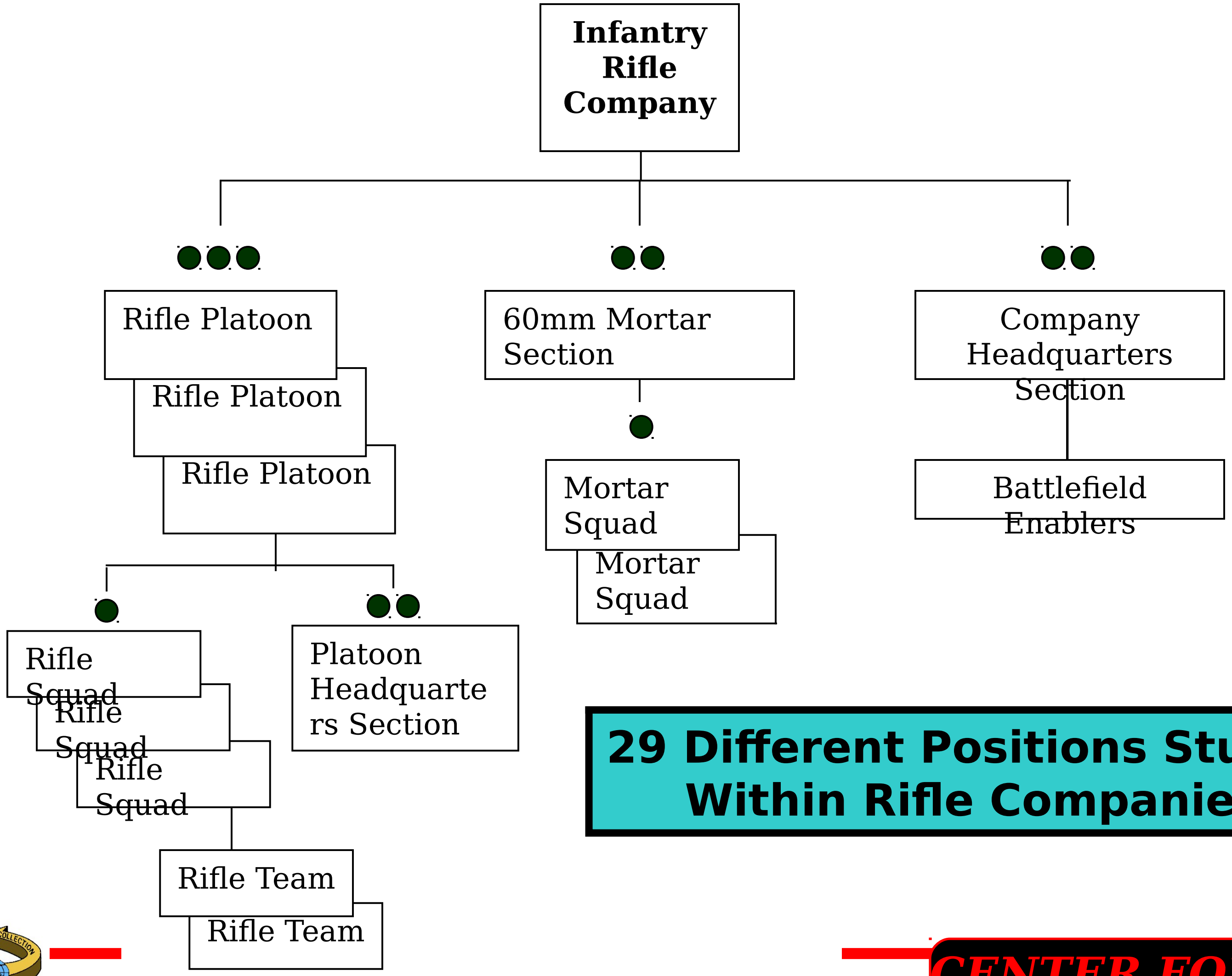
Tactical Ensemble: Everything that a helicopter crewmember wears into the aircraft to include clothing, protective gear, helmet, weapon, ammunition, kneeboard, gloves, etc.

Auxiliary Gear: All additional items that a helicopter crewmember carries into a helicopter that are not immediately worn while performing internal aircraft duties. Auxiliary gear includes individual survival equipment, water, food, additional clothing, etc.

Dismounted Combat Load definitions are based on United States Army Field Manual 21-18, *FOOT MARCHES,* 1 June

Soldier Loads in Combat

Dismounted Study


Infantry Rifle Company
●●●
Rifle Platoon
Rifle Platoon
Rifle Platoon
●
Rifle Squad
Rifle Squad
Rifle Squad
Rifle Team
Rifle Team
●●
Platoon Headquarters Section
●●
60mm Mortar Section
●
Mortar Squad
Mortar Squad
●●
Company Headquarters Section
Battlefield Enablers

29 Different Positions Studied Within Rifle Companies

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Soldier Loads in Combat

Dismounted Data Collecting

Pre-Mission Coordinations:

- Quickly brought into team by Task Force staff.
- Sought missions that:
  - Emphasized dismounted operations.
  - Expected long durations to push logistics.
  - Anticipated contact with enemy to push logistics.

Prep for Combat Collection:

- Weighed and Photographed combat loads.
  - Base Soldier weight.
  - Fighting Load weight.
  - Approach March Load weight.
  - Emergency Approach March Load weight (Rare).
- Provided weight data to units.
- Placed on special teams by units.
- Rehearsed with units.
- Packed identical gear as units.

During-Mission Collection:

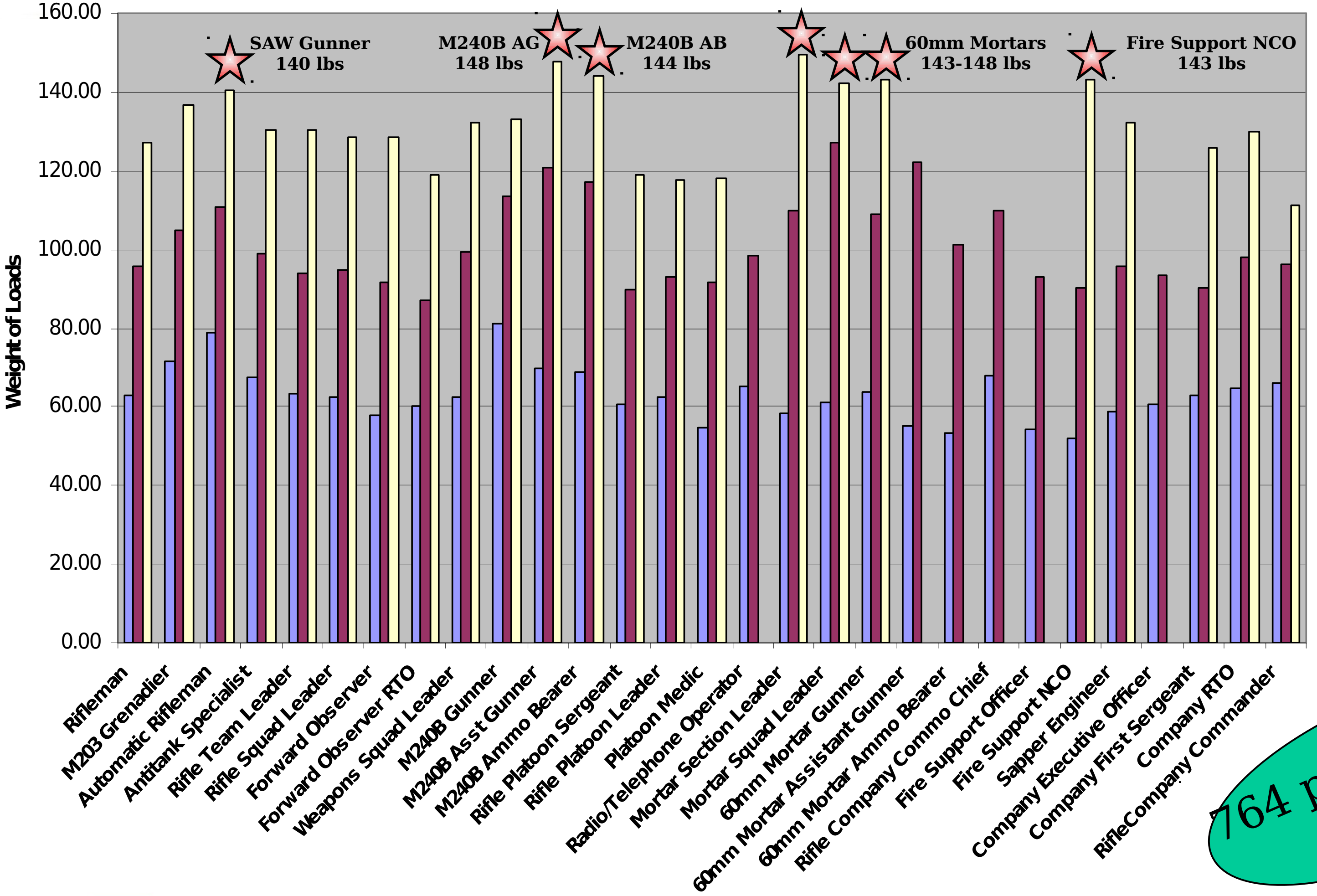
- Went in on assaults at H-hour.
- Executed all tactical tasks with squad/platoon.
- Studied how the Soldiers performed with their loads.
- Studied problems with load carriage.
- Kept photographic log of missions.

Post-Mission Reviews:

- Attended AARs.
- Discussed with units their lessons learned relating to loads.
- Shared photos with units.

Soldier Loads in Combat

Most Loaded Soldiers



764 paratroopers studied

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Soldier Loads in Combat

Dismounted Soldiers Under Load

CAMELBAK

Helicopter Crewmembers Under Load

"GUN 13"

NOT
RAB

7-31111 2200A5 DWG. D REV. 13
O/N A0814313 PVO 756
DO NOT GRAB
CAUTION
SPRING LOADED SEAT
ADJUST ONLY
WHEN OCCUPIED

DO NOT GRAB
DO NOT GRAB

TIE DOWN
06

Soldier Loads in Combat

Helicopter Data Collection

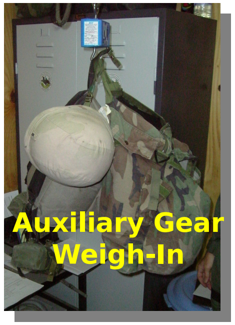
The Helo CAAT interacted with aviation units in 3 ways:

1. Interviewed and surveyed* aviators in Assault, Attack, Cav, Lift, and MEDEVAC units in order to allow Aviators to provide lessons learned. Total= 698 Soldiers in 7 Aviation Brigades and 2 Cavalry Squadrons.
2. Collected physiological and load data during numerous combat operations (overseas only). Total=147 personnel instrumented.
3. Accompanied aircrews on combat aviation missions (overseas only).

*11 separate survey types were prepared through a combination of input
om platform and aircrew equipment Program/Product Managers as well
Ft Rucker, Natick, ARL, CECOM, and MEDCOM to address the
six fundamental questions.

Soldier Loads in Combat

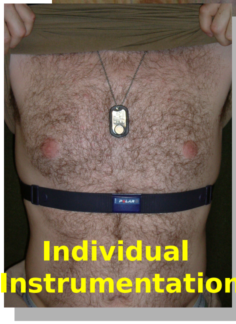
Gear Inventory


Auxiliary Gear Weigh-In

UH-60 Pilot Receives Chest Measurement

Pre-Mission Weights, Measures, and Instruments

UH-60 Pilot Weighs-In with SARVIP Tactical Ensemble


Individual Instrumentation

Auxiliary Gear Weigh-In

UH-60 Pilot Receives Abdominal Measurement

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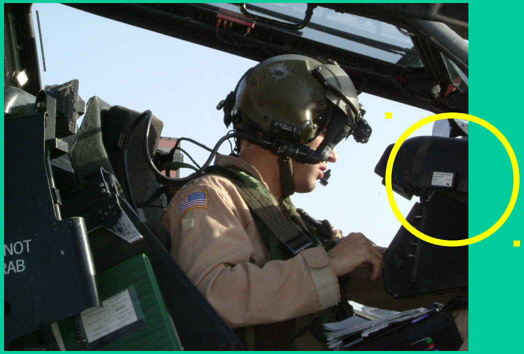
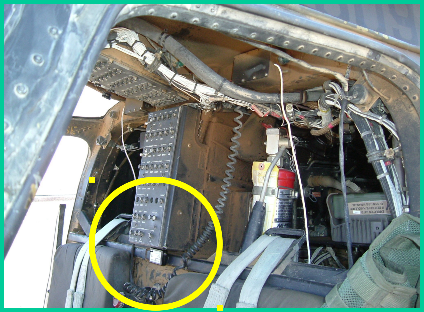
Soldier Loads in Combat

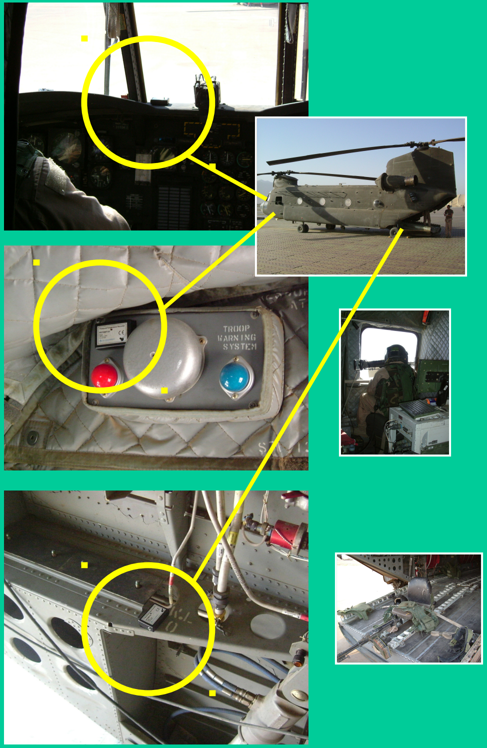
Cockpit and Cabin Placement of Pressure/Temperature Recorders



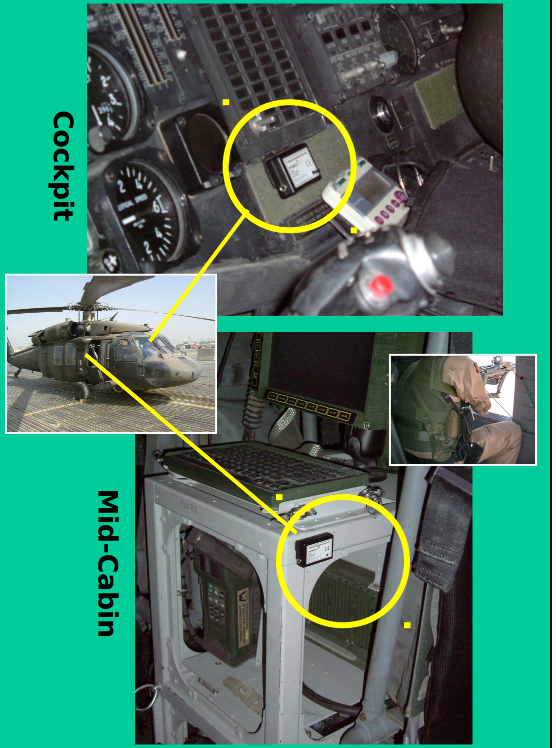
AH-64



OH-58D


Cockpit
Mid-Cabin
Aft Ramp

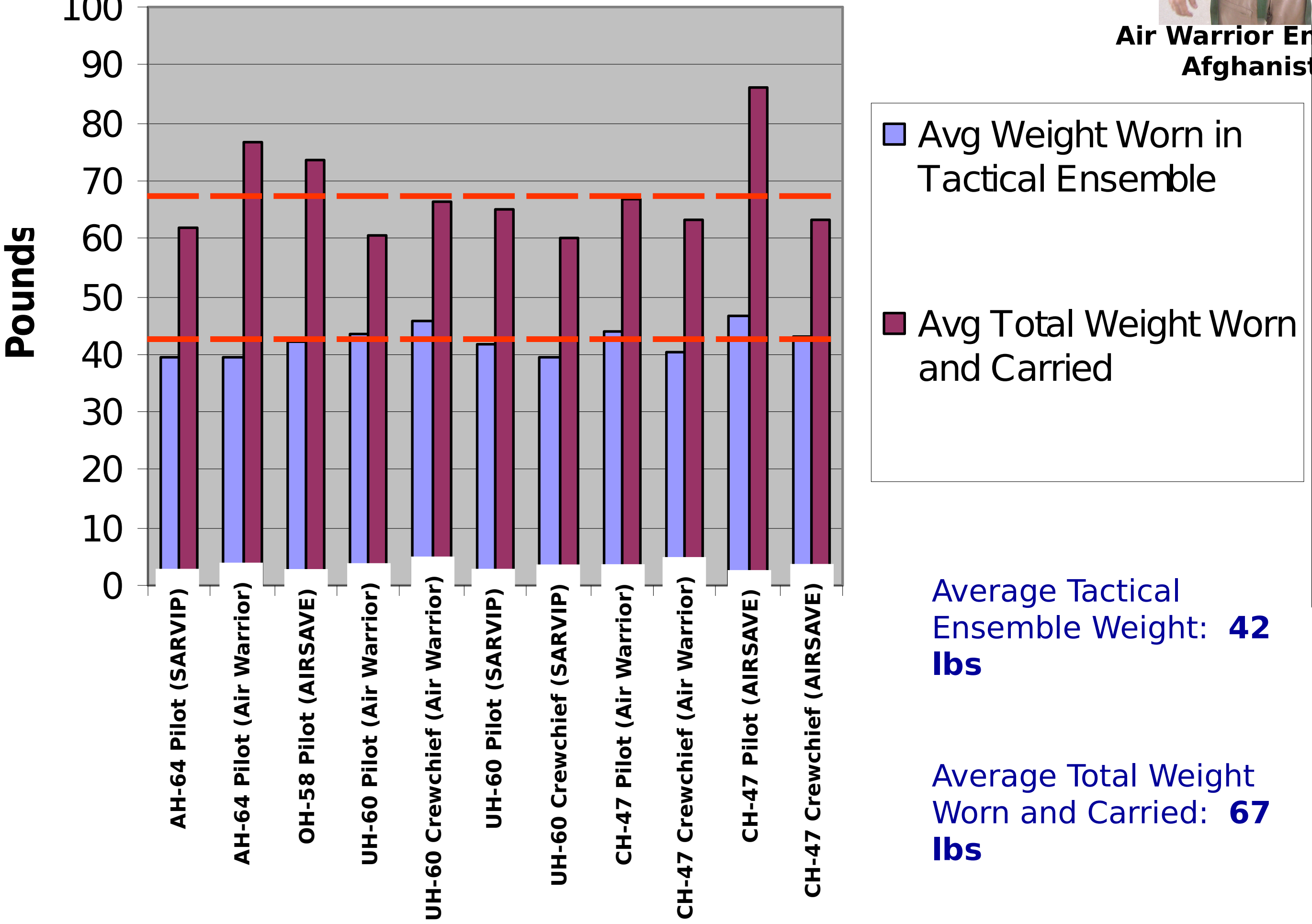
CH-47


Cockpit
Mid-Cabin

UH-60

Soldier Loads in Combat

Aviator Loads in Combat



Air Warrior Ensemble Afghanistan

AIRSAVE Ensemble Iraq

SARVIP Ensemble Iraq

Average Tactical Ensemble Weight: **42 lbs**

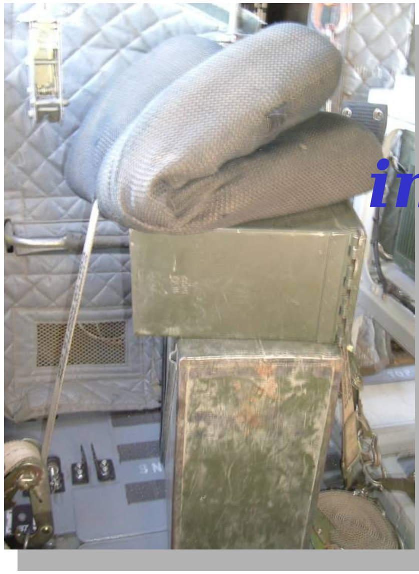
Average Total Weight Worn and Carried: **67 lbs**

Soldier Loads in Combat

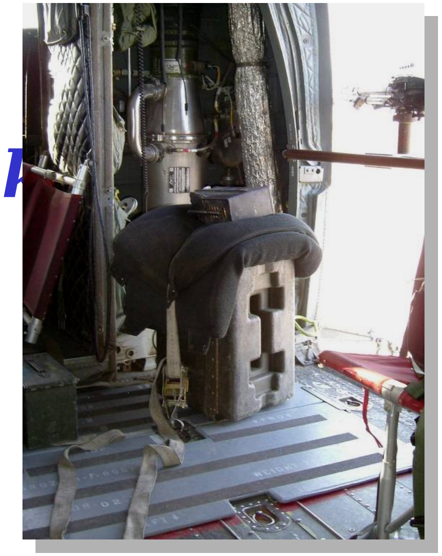
Seats: The Worst Enemy

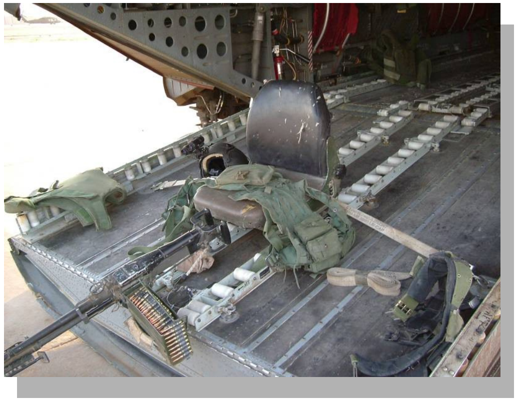
Altered Seat Cushions
in all Helicopters

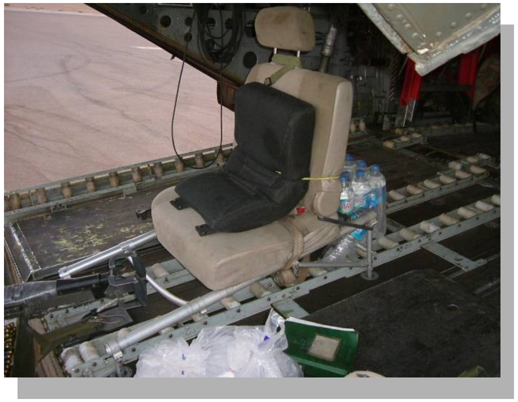
Soldier Loads in Combat

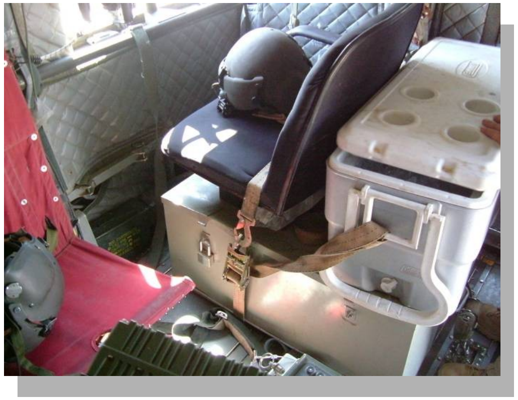


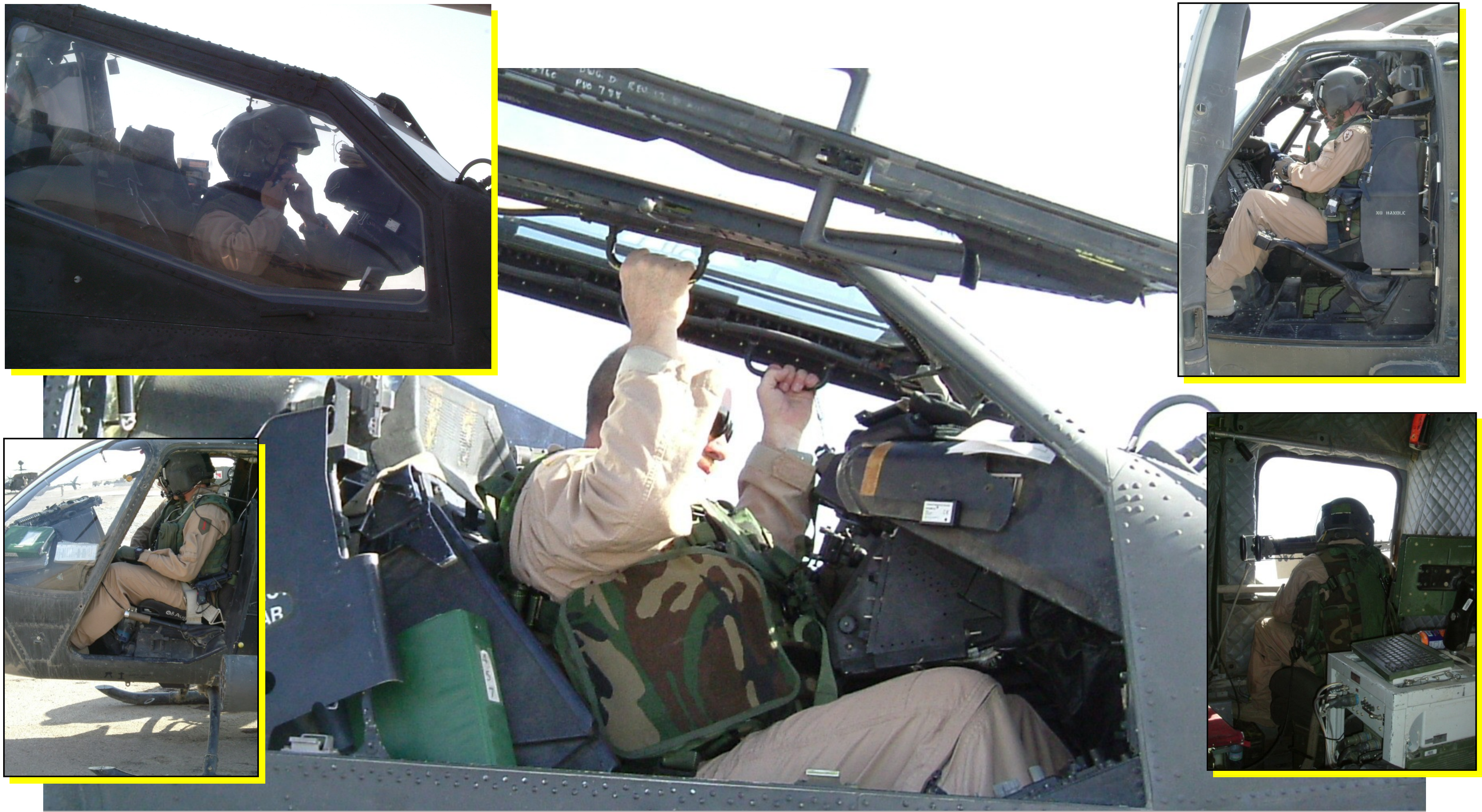
Homemade Seats
in the CH-47 Chinook











The reduction of equipment weight and equipment bulk, coupled with enhanced seat comfort will go a long way toward easing the burden on all helicopter crewmembers.

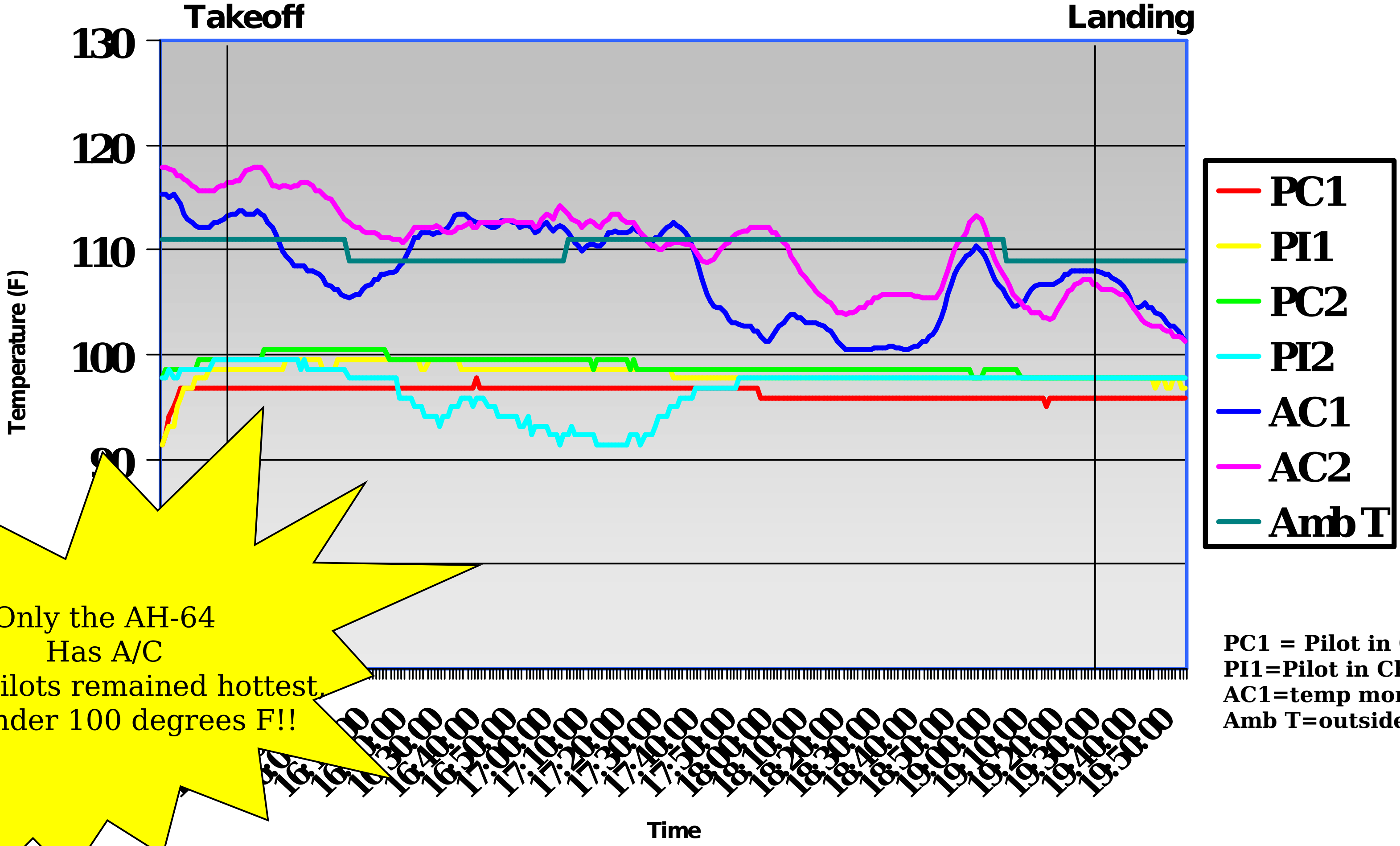
Helicopter crews live in a world of discomfort…for restless hours on end

Soldier Loads in Combat

Physiological Measurement Examples

Soldier Loads in Combat

AH-64 Temperatures in Iraq



Only the AH-64
Has A/C
Yet the pilots remained hottest,
just under 100 degrees F!!

PC1 = Pilot in Cmd of Chal
PI1=Pilot in Chalk 1
AC1=temp monitor in Chal
Amb T=outside ambient te

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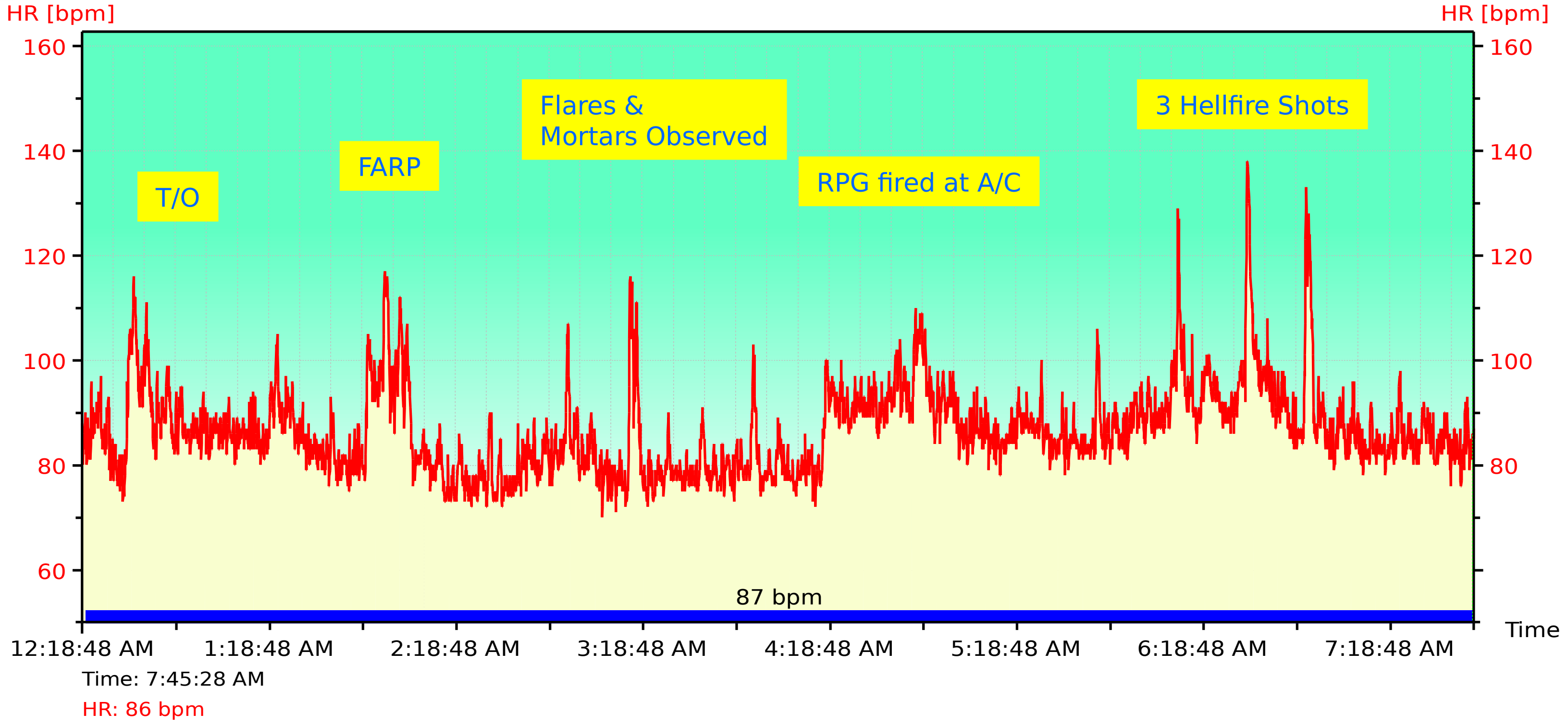
Soldier Loads in Combat

OH-58D Pilot’s Heart Rate During Combat Engagement

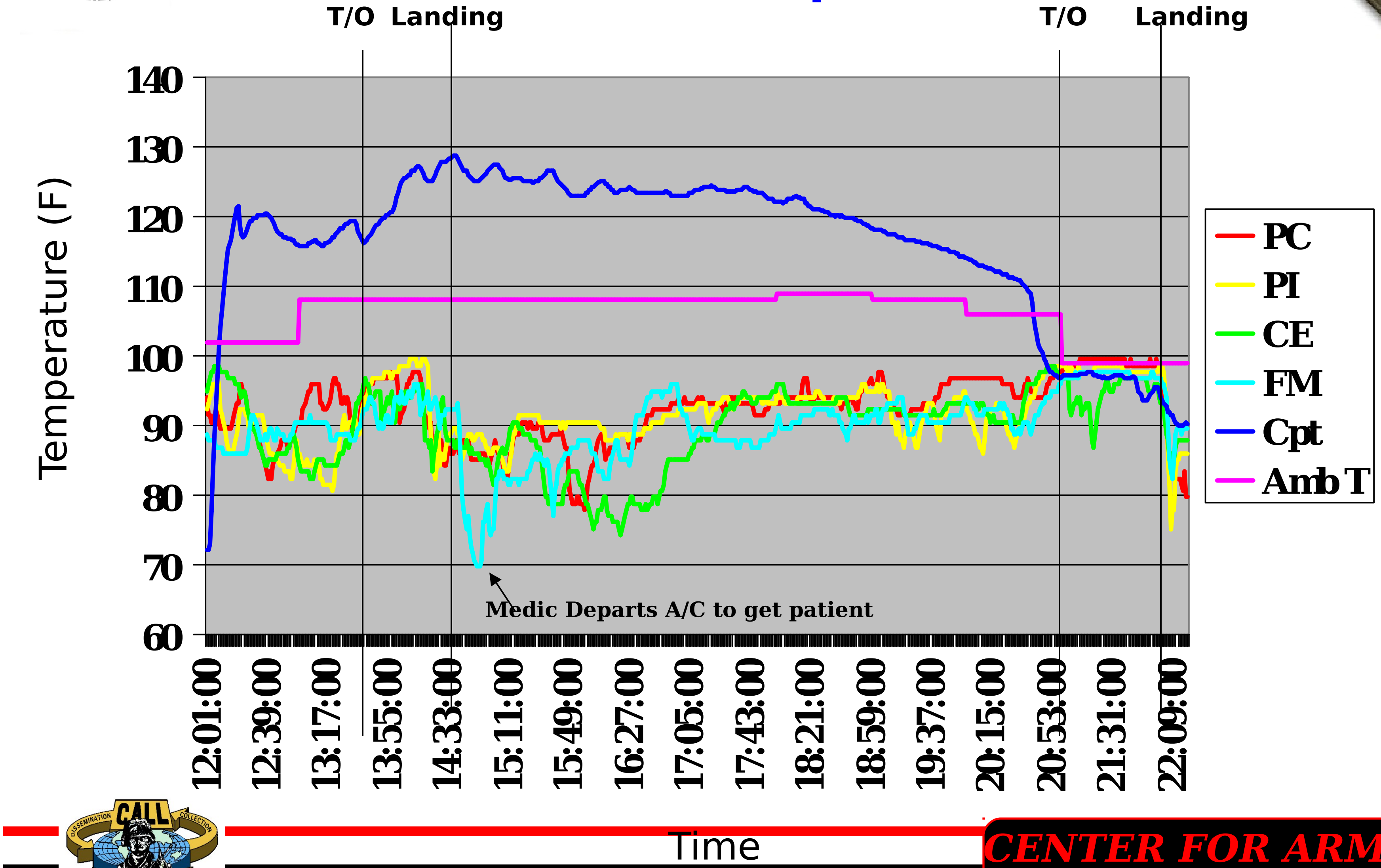
(1LT(P) Bond)



Person	fnite 13aug	Date	8/13/2004	Heart rate average	87 bpm		
Exercise	8/13/2004 11:00 PM	Time	11:00:48 PM	Heart rate max	138 bpm		
Sport	Running	Duration	9:24:55.0				
Note				Selection	12:20:08 AM - 7:45:28 AM (7:25:20.0)		

Soldier Loads in Combat

MEDEVAC Temperatures



Soldier Loads in Combat

Abbreviated Major Findings

Dismounted Soldiers

- While carrying minimal gear, dismounted Soldiers carry excessive w
- Combinations of extreme temperatures, terrain, and loads easily exh fit Soldiers.
- Supply doctrine must be addressed to remove loads from the Soldie enhancing resupply.
- Materiel developers must push the envelope for reducing the weigh equipment while enhancing multi-functionality of items.

Aviation Soldiers

- Bulky, heavy individual equipment rapidly exhausts these fit crewme remain stationary for hours on end.
- Poor seat design and poor human-machine interfaces cause crewme continuous and often excruciating pain.
- Materiel developers must create ensembles and aircraft that enhan
- All crewmembers need to receive adequate and protective seats.
- Crewmembers wear too much survival equipment for the war at han

Soldier Loads in Combat

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